



# **ASHESI UNIVERSITY COLLEGE**

**A UNIVERSAL ONLINE APPLICATION SYSTEM  
FOR UNIVERSITIES IN GHANA**

**APPLIED PROJECT**

B.Sc. Management Information Systems

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**2017**

**ASHESI UNIVERSITY COLLEGE**

**A Universal Online Application System for Universities In Ghana**

**APPLIED PROJECT**

Applied Project submitted to the Department of Computer  
Science, Ashesi University College in partial fulfilment of the requirements for the  
award of Bachelor of Science degree in Management Information  
Systems.

**Tobel Sylvia Eze-Okoli**

**April 2017**

## DECLARATION

I hereby declare that this applied project is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature:

.....

Candidate's Name:

.....

Date: .....

I hereby declare that preparation and presentation of this applied project were supervised in accordance with the guidelines on supervision of applied project laid down by Ashesi University College.

Supervisor's Signature:

.....

Supervisor's Name:

.....

Date:

.....

## **Acknowledgement**

I would like to thank my supervisor, Mr. Kwadwo Osafo-Mafo, for his guidance and immense contribution towards the completion of this project. I am also thankful to Mr. David Sampah whose doors were always open to me when I needed his help.

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This entire project could not have been successful without my parents, Arc. Victor and Mrs. Ifeoma Okoli. I am forever in their debt.

Finally, I thank God for giving me the endurance and motivation to begin and complete this project.

## **ABSTRACT**

Roughly half of the universities in Ghana still require applicants to send their applications in via post or in person. This places a huge burden on the applicants as many factors come into play, the biggest one being distance. Unnecessary costs are incurred by both the applicants and the schools. Another problem with the current application system in Ghana arises from the fact that universities ask for quite a lot of information from their applicants. In the case where applicants apply to multiple schools, the application process becomes repetitive and tiresome.

In this paper, a solution is proposed whereby applicants create an account, fill their personal information once and be able to apply to multiple schools. This application streamlines the application process and makes it more convenient for its users. All the information required by the schools is managed in one account, reducing the stress and burden of applicants remembering various combinations of usernames and passwords.

Research was conducted and requirements gathered to provide a basis for this solution. After requirements had been identified, the web application was designed using use cases and necessary diagrams. The application was implemented with the use of HTML, CSS, PHP and JavaScript languages. The system was finally subjected to testing (development and user) to ensure that it meets its requirements. Feedback was collected for future work

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# **CHAPTER 1: Introduction**

## **1.1 Introduction and Background context of the problem**

Studies have shown that students take into account distance as a major factor in their choice of university. As a result, most students apply to universities close to their home or in their residence regardless of their qualifications. The significance of this factor is magnified by the fact that some schools request that the application forms or other supporting documents be delivered via post or in person. This circumstance causes various problems for the application process becomes expensive and time-consuming. Furthermore, it is understandable that students apply to more than one school to increase their chances of getting into a university of their choice. Therefore, with schools asking for the same information from their applicants, it is stressful and tiresome giving the same information to multiple schools.

## **1.2 Significance of the problem**

It is obvious that the number of applications that tertiary institutions receive annually is quite more than the applicants seeking admission. This means that a significant percentage of applications that the schools receive are redundant and this pointedly increases the amount of work the school's administration has to go through while examining the applications. Costs are also incurred as schools would have to dispose of these applications since most of the applications are sent via post or email at the end of the application period. With this method, schools also have no effective system of storing applicants' information.

Furthermore, in a sample of 63 top universities in Ghana, 32 universities are located in Accra ("Top Universities in Ghana | 2016 Reviews & Rankings", 2016). To get into the top schools

in the country, most applicants would apply to most of these schools included in the sample. However, some of these schools require the applications to be submitted to the schools via post, email or handed over in person. Hence, prospective applicants incur costs as some of them would have to travel long distances from their homes to the school which may be in a different region. Such unfortunate circumstances could deter qualified applicants from applying to schools of their choice.

Statistical data across the world (UNESCO-UIS, 2009; UNESCO-UIS, 2011) and various studies (Assié-Lumumba, 2008; Leach & Mitchell, 2006; Mama, 2003; Morley et al., 2009; Morley et al., 2010) show that students from deprived school districts and in particular rural areas have limited access to quality education. In a similar study, Manuh, Sulley, and Budu (2007) argued that “the most significant factor enhancing the chances of access to university in Ghana was the region (and indeed, location) of residence” (p. 82). About 70% of students in the five public universities reside in only three regions, namely, the Greater Accra (GAR; that is, capital), Ashanti (ASH), and Eastern Regions (ER), suggesting that students from these regions have the best chance at gaining admission into the university (Manuh et al., 2007). These studies show that the region or high school of residence is a major determinant of access to and participation in higher education.

In relation to the distance factor, the costs, and burdens of applying to schools in Ghana are heavier on international students. The current application system in Ghana makes it hard for international applicants to submit their applications to schools. This poses a problem for universities in Ghana which want to increase the diversity in their student population. According to research carried out by Gyamera, strategies have been adopted by the universities in Ghana over

the years to position themselves internationally (2015). This indicates that increasing the diversity of their students is a major goal for Ghanaian universities.

According to the National Accreditation Board's Tertiary Education Statistics Report for the 2012/2013 academic year, foreign students constitute 1% of the total student population in Public Tertiary Education Institutions (TEIs). Of this 1%, students from West Africa constitute 80%. Approximately 8% students are from outside of Africa. A relatively higher proportion of students in the Private TEIs, compared to Public TEIs, are foreign students. Foreign students comprise 18% of all students in Private TEIs.

From these statistics, it is evident that for both Private and Public TEI's to increase the diversity in their student body, some impeding factors such as distance would have to be eliminated. This would make the application process more convenient and attract more international high-schoolers to apply to the schools.

With all these factors mentioned earlier, it is clear to see that the current application system for tertiary education is stressful, expensive, and unnecessarily time-consuming for both the schools and the applicants. The application process needs to be redesigned in a way that makes it more efficient, cheaper, more convenient, time-saving and sustainable.

### **1.3 Proposed Solution**

As a solution to the inconvenient system of applying to universities, a web application is proposed whereby applicants can fill one general form and other specific requirements for schools which require them. All college application systems would be online and converged onto one platform (the web application). The more schools which are converged, the fewer the problems faced by the applicants such as distance involved in buying and submitting application forms. With

this online platform, applicants will be able to apply to multiple universities and pay cheaper application fees more conveniently. This web application would provide equal access of school application systems to university applicants regardless of their location in the world.

#### **1.4 Related Work**

Currently, a significant percentage of Ghana's higher education institutions have no definitive application system through which university applicants can apply to. As mentioned earlier in the introduction, the present application system is inconvenient, time-consuming and expensive for the applicants. Universities in Ghana either have only a paper-based application system or make use of both an online form and a paper-based form. Meaning that after filling an online form, the applicant is still required to fill and submit some documents physically to the university.

However, developing countries have found ways to combat this problem. The Common Application is quite prominent in the United States. It is an online platform whereby applicants can fill one general form with all the relevant information and then go ahead to fill out various requirements specific to some specific schools. This process thereby eliminates the stress and hassle of applicants going to different schools to pick up their forms and then filling in the same information in different forms. It is also more convenient in paying for the application fees rather than the hassle at the banks.

Another related work in this field quite similar to the Common Application is the Universities and Colleges Admissions Service (UCAS) application system in the United Kingdom. Presently, more than 50% of the schools in the UK are currently enlisted in UCAS. Both Universities and Polytechnics benefit from this coalition and slight adjustments are made to cater

to both. While using this software, applicants can fill one form and get it sent to as many schools as they want. There is also a tool provided by UCAS which allows their applications to be tracked as well as UCAS Clearing Service which allows unplaced students to apply for courses with vacancies in schools.

Examining these two application systems, it is easy to see that although they are both implemented in two very different locations, which are quite different in many aspects including culture, required examinations, geography and high school curriculum, that both systems have been successful in their meeting their objectives. These two application systems were built to have a more organized and effective method of going through the application process. It is possible to see that their various application systems do cater to those differences. Seeing as these are two different countries implementing similar application systems, it is quite possible to say that an online platform where applicants can fill one form and send it to multiple schools can be implemented in Ghana as well.

Another significant fact to note about these coalitions is that the schools' application systems are all online. These coalitions would not be possible without all schools possessing an online application system. As previously stated, some higher education institutions in Ghana do not have a complete online application system. However, the proposed application caters to all schools included in its portfolio by allowing them to migrate from the current paper-based system to the application's online platform.

At the beginning of the year 1999, Washington State University adopted a new document imaging system with which they were able to sort and scan the applications they received (Cross, Frazier, & Hulett, 2000). The migration from the old system of paper admission file folders to this

improved efficiency in the admission process. The improvements can be seen in the elimination of waste of paper and applications could be tracked as well as increased accessibility.

Universities in Odisha, India also introduced a paperless system which is done in a web-based network (Rout, Madichetty, Mishra, & Pattnaik, 2012). An Internet Communication Tool which improves the efficiency of the admission process. This tool essentially eliminates the traditional office paper processes into electronic processes by increasing both intra-office and inter-office communication.

Looking at the high rate of internet usage in Ghana especially among the youths, it is quite safe to say that applicants would not have a problem switching to an online application process from the paper-based application (Foster, Goodman, Osiakwan, & Bernstein, 2004). Furthermore, the rise of internet cafes in many parts of Ghana also attest to the feasibility of this online application system as it is quite popular among the youth (Brinkman, Nyamnjoh, & Bruijn, 2009). A survey shows that 23.7% of the respondents use the internet always for educational purposes while 45.6% use it frequently, 25% occasionally, 5% rarely use it and only 0.6% never use it for educational purposes (Quarshie & Ami-Narh, 2012).

## **1.5 Motivation**

Some of the problems that arise from the current application system in Ghana are the loss of transparency, lost application forms and poor communication between the schools and their applicants. This application is scalable in the sense that it could potentially improve the education system in Ghana. A platform where current high school and university students can easily apply to schools of their choice without expending unnecessary resources such as transport costs and



time is a life-saver for many. With this platform, the applicant can track his/her application without any stress, thereby imbuing integrity into the process.

Furthermore, with the national movement towards to a cashless system, the growth of mobile money and the innovative additions of the use of ATMs have facilitated this solution. This application takes advantage of this trend by including online payment options for the payment of the application fees.

## **1.6 Objectives**

The main objective of this project is to make the application process to higher institutions convenient, cheaper and simple while fitting into the current admissions process of schools seamlessly. This main objective can be broken into three further objectives and it will be explained in detail how the application fulfils each objective. The web application will be able to fulfil the following objectives:

### **1.6.1 Enable applicants to fill and submit complete applications**

The application would enable the applicant to submit complete applications to multiple universities online. The primary purpose of this application is to make the current application process easier and cheaper for the applicant. Therefore, the application would have to make certain that regardless, of how many schools the applicant selects, the applicant provides the barest minimum information and that no information is repeated. The application will streamline the application process by finding the common information required by the majority of schools.

### 1.6.2 Enable schools to receive and review applications

The application would enable the schools to receive and review applications from applicants. The web application would provide the school admissions staff with an admin portal which requires them to log in with the school's username and password. After logging in, the school is given a list of applicants which have started an application for that school. Therefore, the school can also receive applications which have been started but not completed, submitted or paid for. Schools would also be able to view trends and statistics about the applications they receive.

### 1.6.3 Payment system to process application fees

To application would provide multiple online payment options for the payment of application fees. These online payment options would be provided with the integration of a secure and credible payments platform.

## **CHAPTER 2: Requirements**

The purpose of this section is to provide a detailed description of the functionalities of the proposed web application tailored to meet the needs of the university applicants.

### **2.1 Scope**

The software product to be produced is an online web application. The web application can be accessed from any device, mobile or not. The only requirement is that the device has browser functionality and that there is access to the internet. The user will be required to sign up for an account where he/she would be given an ID. This applicant's ID would enable the web application to link the applicant to all his/her applications. The web application would require the applicant to fill a general form which asks for information such as the applicant's personal information, academic history, examinations and copies of passport bio pages and exam scores. This general form contains the information required by a majority of schools. However, based on the schools selected by the applicant, there may be another form that he/she would be required to fill as some schools would have extra information specific to that particular school.

To enable payments for the application fees, there will be a payments platform. Various payment systems will be explored to determine the best fit for the application. The applicant will also be notified via SMS whenever he/she registers on the application, pays and submits an application to a school. This would keep the applicant in the loop and increase transparency in the application process. Currently, the application would only be able to roll out for first-year undergraduate admission only. Processes for transfer and graduate admissions are not provided for in this application. Options for scholarship and financial aid application are not also provided for in this application.

To prevent redundancy in the database, applicants will be required to sign up with their email addresses to which an authentication link will be sent. This would prevent applicants from applying with multiple accounts and creating redundant applications.

A separate portal for the school admissions staff where they are required to log in with the school username and password is provided on the application. With this portal, the schools will be able to view statistics and trends of the applicants applying to their school as well as their application forms. Both portals will interact with the same server and database.

Another separate web page will be designed and implemented for the admin to update the payment status of the applications. The admin will also be able to register a school on the web page and add it directly to the database.

## **2.2 Requirements Gathering**

The process of gathering the requirements was carried out through the means of questionnaires and interviews with the subjects. The questionnaires were filled out anonymously by current first-year undergraduate students in Ghana. This segment was chosen as the subjects for the questionnaires as they recently went through the application system and as a result, will be able to draw on their experience which would be very useful in this research. The user requirements were gathered through random sampling.

College admission staff at private universities were also interviewed as they would shed more light on how a new universal application system would fit into their current admission process seamlessly as well as what gap it would fill. Ideally, the research would include both private and public universities in Ghana, however, due to insufficient resources, the college admission staff interviewed worked at only private universities.

Related works such as The Common Application and the UCAS were explored to gather information about the possible ways the proposed application system could be designed and implemented.

Finally, requirements were also gathered from the application forms of five selected universities in Ghana. These schools are Ashesi University, Radford University, Lancaster University, Central University and the University of Ghana. Information collected from the application forms were collated and examined to decide how the application system would be designed and implemented.

### **2.3 Requirements Analysis**

Based on the data collected from the results of the questionnaires, some of the requirements which were discovered required that the application system be easy to use and convenient. It should speed up the application process and prevent the use of repetitive information especially in the case where the applicant is applying to multiple schools and needs to fill in the same information for multiple schools. The system should also be able to track the application after submission to the schools and update personal information such as emails and home addresses.

For the school admission staff, they were more interested in getting the information they would usually ask of students in the current system. Although all schools ask for slightly similar information from their applicants, there may be specific information that applicants are required to provide such as programme choice and campus location. Another requirement for the schools was the provision to view relevant statistics of the applicants such as their gender and nationality.

## 2.4 Users

Three users were identified in this research which are the university applicants, college admission staff and the admin. Therefore, there will be a separate web portal provided where college admission staff can log in with the school's credentials and view applicants who have selected only their schools whereas the university applicants would be able to start, edit, complete, submit and track applications. Although the admin is not a primary user of this application, an interface would be created to enable the admin to change the payment status of the application. There will be a separate payment platform on which application fees are paid for and tracked by the admin user.

### 2.4.1 University Applicants

Use case:

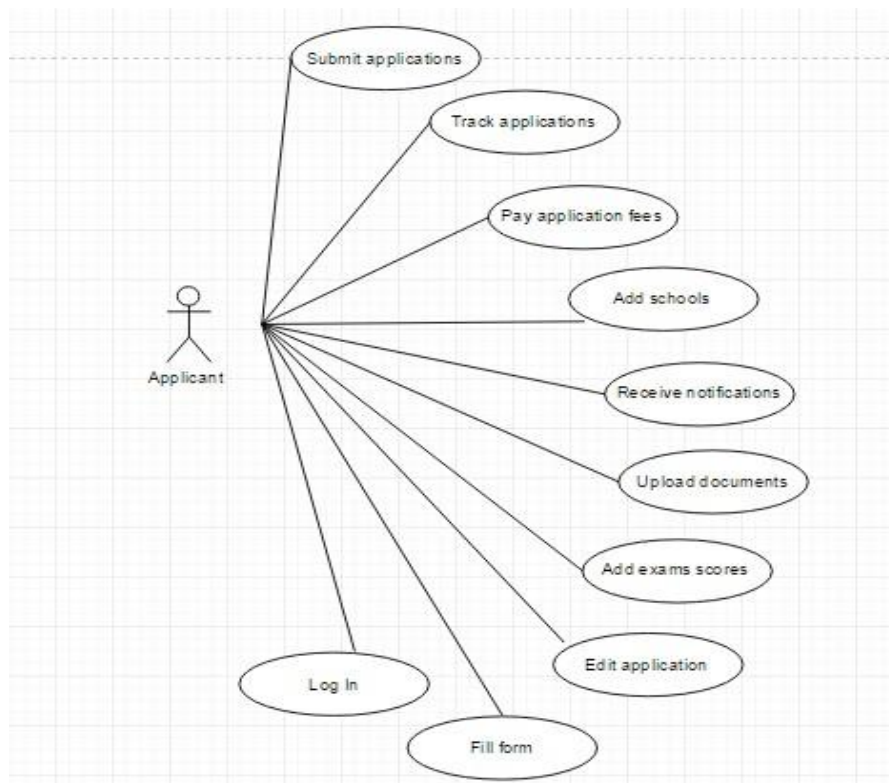


Figure 1 Use case Diagram for applicant

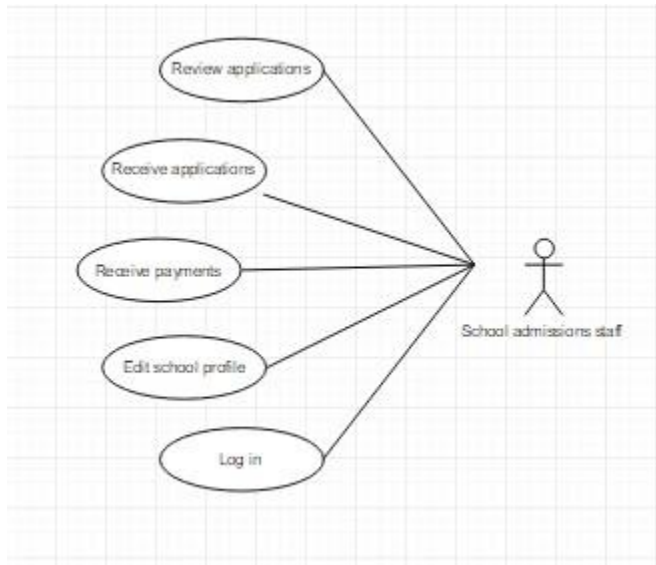
### Scenario:

An applicant wishes to apply to Ashesi University, Central University and the University of Ghana from Nigeria. To do this, the student will have to register on the web application by creating an account. The applicant receives an SMS notification immediately after registration. After creating the account, the student can log in at any time and edit the application at any time. The applicant will be required to fill in information such as the personal bio data, exam scores and uploading documents such as transcripts and passport pages. While filling the form, the applicant can select the schools which he/she wishes to apply to. If any of those schools have specific additional requirements, then the student will have to fill them before submitting the form to the schools.

The applicant has the option to submit the application before payment is made although the application will not be reviewed. There are different payment options from which the applicant can pick the most convenient mode. After she has paid the application fee for a school's form, then she can click the submit button thereby submitting the form to the school. The student can log out at any time and her progress will be saved. The applicant can also log in the future to apply to additional schools without starting the whole application process again as well as edit her application. The student will also receive automated emails and SMS notifications when she has signed up or submitted or paid for an application.

### 2.4.2 School Admissions staff

#### Use case:



*Figure 2: Use Case Diagram for School Admissions staff*

#### Scenario:

The school admissions staff employed at Central University will log in with a given username and password. After login is successful, the staff can perform a variety of functions. The staff can edit the school details which is visible to the applicants such as deadlines and application fee. A list of applicants will be displayed as well as charts describing the statistics of the applicants. The staff member will have to select a particular applicant to view their application. Applications which have been started but not completed or paid for can also be seen by the staff. The staff member can also review the application by changing the status of the application to accepted, rejected or pending. The staff will also get notifications for which application has been paid for.



### 2.4.3 Admin

#### Use case:

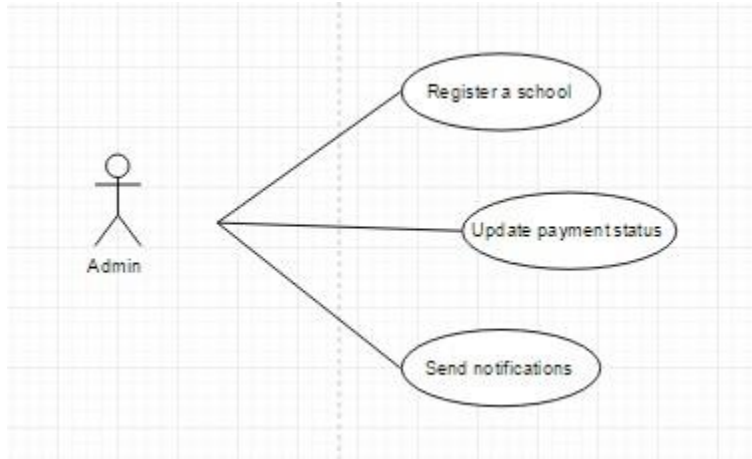


Figure 3: Use Case Diagram for the Admin

#### Scenario:

The admin has the responsibility of acting as a liaison between the schools and the university applicants. The admin receives notifications when a payment has been made and therefore updates the status of the application and notifies the applicants that the payment has been received. The admin can also register a school on the admin page.

## 2.5 Functional Requirements

Functional requirements for applicants include:

- Login/Register: an applicant should be able to have access to his/her account. For security measures, the applicant will be required to provide an email and password combination for authentication purposes.
- Edit personal information: an applicant should be able to update his/her personal information and academic history whenever he/she is logged in.

- Upload documents: an applicant should be able to upload copies of necessary documents such as the passport bio page, passport picture, transcript and exam scores.
- Submit an application: an applicant should be able to select a school to submit a complete application to.
- Pay application fees: an applicant should be able to pay the application fees from a variety of online payment options.
- Track an application: an applicant should be able to track the process of all applications made by the applicant.

Functional requirements for the schools include;

- Viewing applications: a school should be able to view the applications created for their school.
- Reviewing applications: a school should be able to review applications which have been received.
- Editing the school profile: a school should be able to edit their school profile.

Functional requirements for the admin include:

- Register a school: the admin should be able to register a new school.
- Update payment status: the admin should be able to update the payment status of an application.

## **2.6 Non-functional requirements**

Some of the non-functional requirements for the application include;

- High performance: the ability to load web pages quickly regardless of the amount of data to be loaded.
- Easy to use: The application should be easy to use as this would help reduce the number of calls schools receive from applicants asking for clarification about the process.
- Efficient data storage: Seeing as schools receive a lot of information from students, storage of data is significant requirements. Data needs to be streamlined and storage efficiently used.
- Availability: Schools receive applications from international students, therefore, the application has to be available and accessible 24/7 at all times from any part of the world.
- Scalability: The application should also be scalable as schools' requirements are not static but ever changing. Therefore, the application should be flexible and easy to modify in the future.

## **2.7 Organizational requirements**

For the payment platform, the schools would be required to accept online payment. The school would be required to take at least one of the following modes of payment for their application fees; debit or credit card and mobile money. This would enable the school to receive payments made by the applicants.

## CHAPTER 3: Architecture and Design

This section provides a summary of the architecture and design of the proposed application. A high-level design which satisfies the requirements specified earlier will be provided in this section.

### 3.1 System Overview

The system is a web application which would allow applicants to access their applications on any device or in any geographical location. The application also provides a platform on which applicants can pay the application fees. An administrative portal is also created for the schools to log in, view and review the applications which have been submitted to that particular school. However, both the applicant and school portals will use the same database and server. Both portals are integrated into one web application. The only requirement for this application is access to the internet on a device which has a browser functionality. This application can be used on mobile phones, tablets, laptops or PC's and no specific operating system is required.

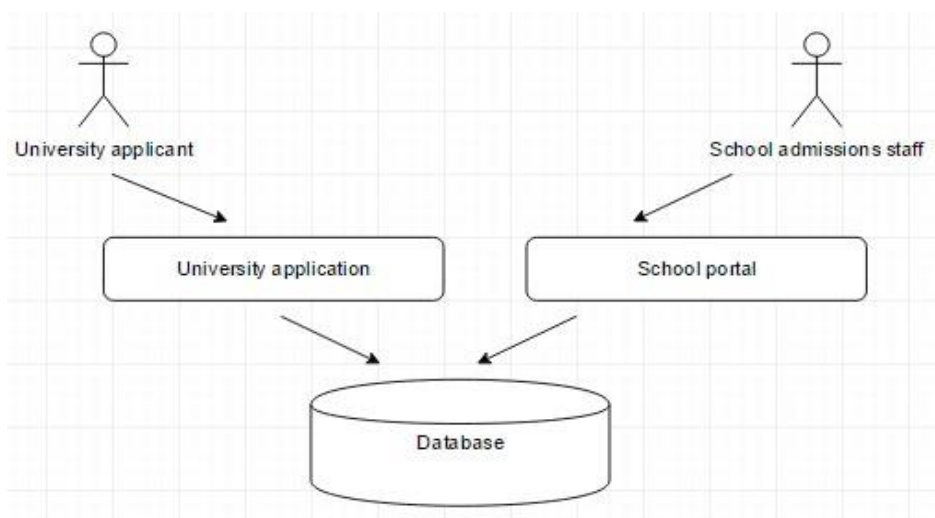


Figure 4: High-level architecture

## 3.2 System Architecture

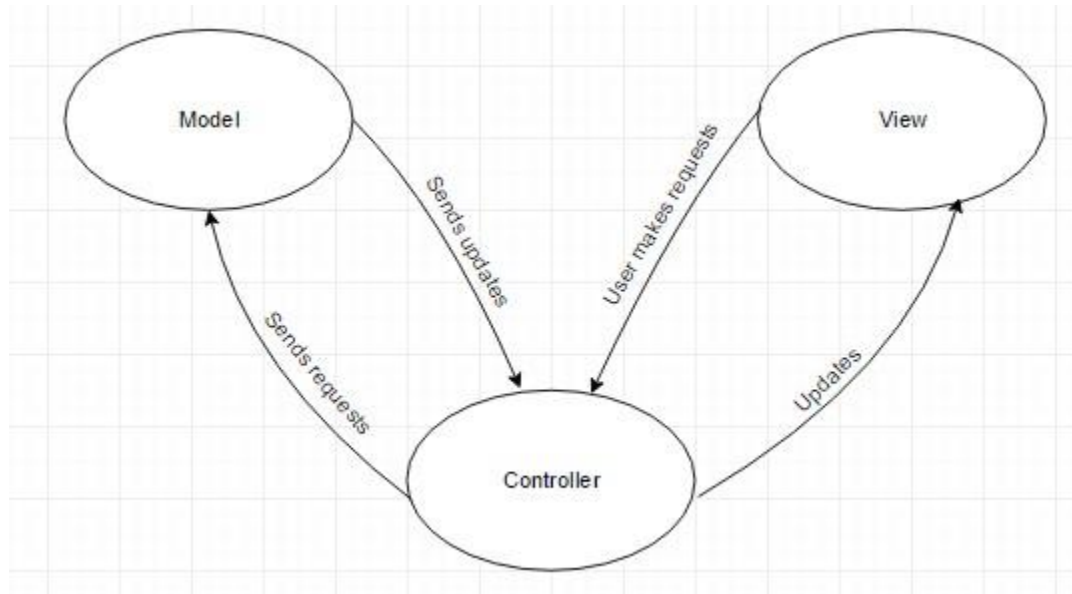


Figure 5: System Architecture

### 3.2.1 Model

The model for this application consists of PHP classes based on the objects. Functions are derived from these classes based on their requirements. The classes used are;

- Adb: This is the root class for all classes. Functions found in this class are connecting the database, running queries and fetching from the database.
- Applicants: This class manages the functions which allow the applicant to utilize the application. Functions include signup, login, getting and updating the applicant's personal

details and academic records. This class also includes the function which sends an SMS notification when the applicant signs up.

- **Application:** Functions in this class are involved assist in the creating, editing and submitting an application to a school. Functions include adding a school, deleting an application to a school. Functions also include creating, editing and getting the applicant's information from a specific school form.
- **Schools:** This class manages the functions relating to the schools. Functions include login for the schools, retrieving statistics of the applicants, retrieving and updating the schools' information.
- **Exams:** This class includes functions that enable the applicant to add and edit his/her exam scores in the application.

### 3.2.2 View

This is the interface of the application which is generated with HTML, CSS and JavaScript. To maintain a consistent feel of the application, a HTML Bootstrap template was utilized for the frontend. The webpages flow in an orderly fashion with a sidebar which allows the user easy access to other sections of the web application.

The queries are all run in AJAX, therefore, presenting the frontend with dynamic content and fast querying. The use of client-side AJAX functions at the frontend allows users to interact with the interface while still loading data. This would ensure fast response of the pages.

Three different views were designed for this application. Each view was designed for the use of the applicant, school admissions staff and the admin. With these three interfaces, their various users make requests to the controller which returns or updates information in the database.

### 3.2.3 Controller

The controller is the logic that deals with updates and retrieval of data from the model. The controller for this application is the PHP AJAX page which receives requests from the client side and updates the data in the model as well as retrieves data to display to the user.

## 3.3 Component Diagram

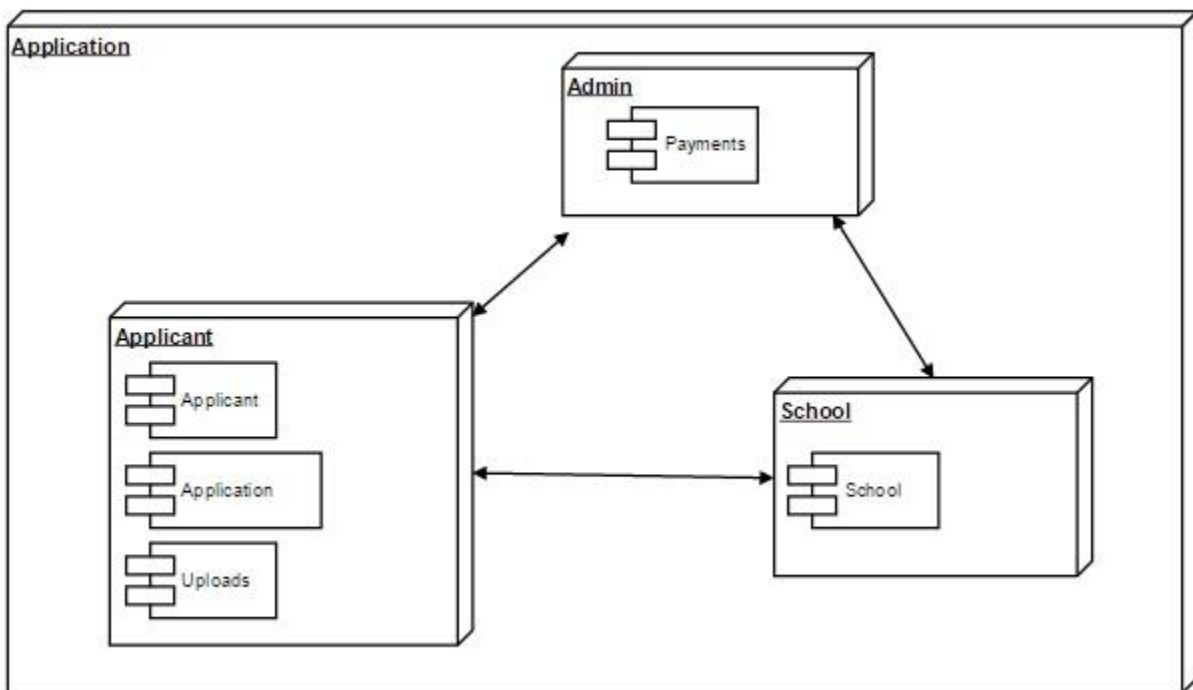


Figure 6: Component Diagram

### **3.4 Activity Diagrams**

#### **3.4.1 University Applicants**

The activity diagram was drawn from the scenario presented earlier in Chapter 2. The applicant will be required to authenticate him/her by logging in with a username and password or register if the applicant has neither. If authentication is successful, the applicant is logged into the web application where a session is created. This session would ensure that the system can retrieve the applicant's previous information and update as well.

Once logged in, the applicant can fill the personal section which asks for general information such as the personal bio data and parent's information. The applicant can also upload necessary documents such as a transcript, official exam scores, passport picture and passport biodata page. Scores for exams such as WASSCE, IGSCE, TOEFL and SAT can be entered by the applicant depending on the desired school's requirements.

The applicant selects a school from the list and fills any extra requirements specific to that school. The applicant can, however, pay for the application fees before or after submitting the application to the school. The application can be tracked by the status of the application as well as SMS notifications sent to the applicant. The applicant can log out when he/she decides and the progress made will be saved.



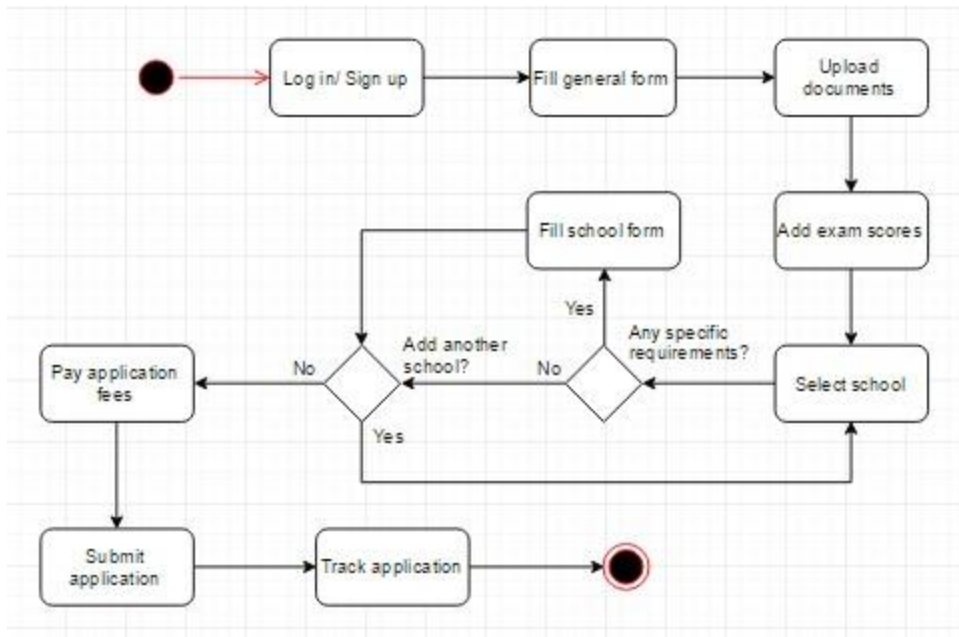


Figure 7: Activity diagram for Applicants

### 3.4.2 School admissions staff

The school admissions staff would be required to log in with the school's username and password. After log in, the staff can view the list of applicants who are applying to that particular school and from this list, select an applicant's application to review.

The staff member can also edit the school's profile and any changes will be reflected on the applicant's portal. The staff member can log out and the progress made will be saved.

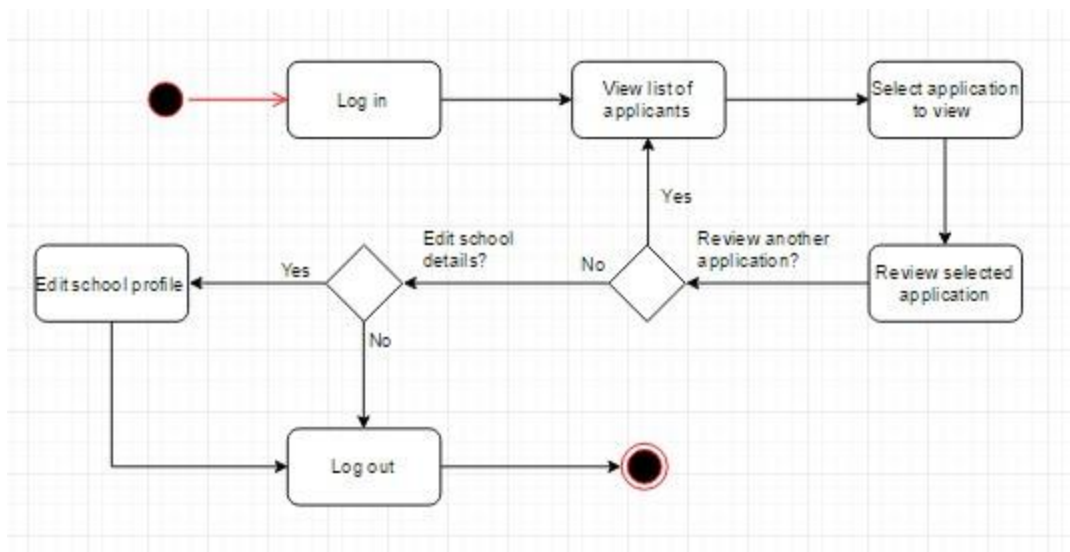


Figure 8: Activity diagram for school admissions staff

### 3.5 Extended Entity Relational Diagram

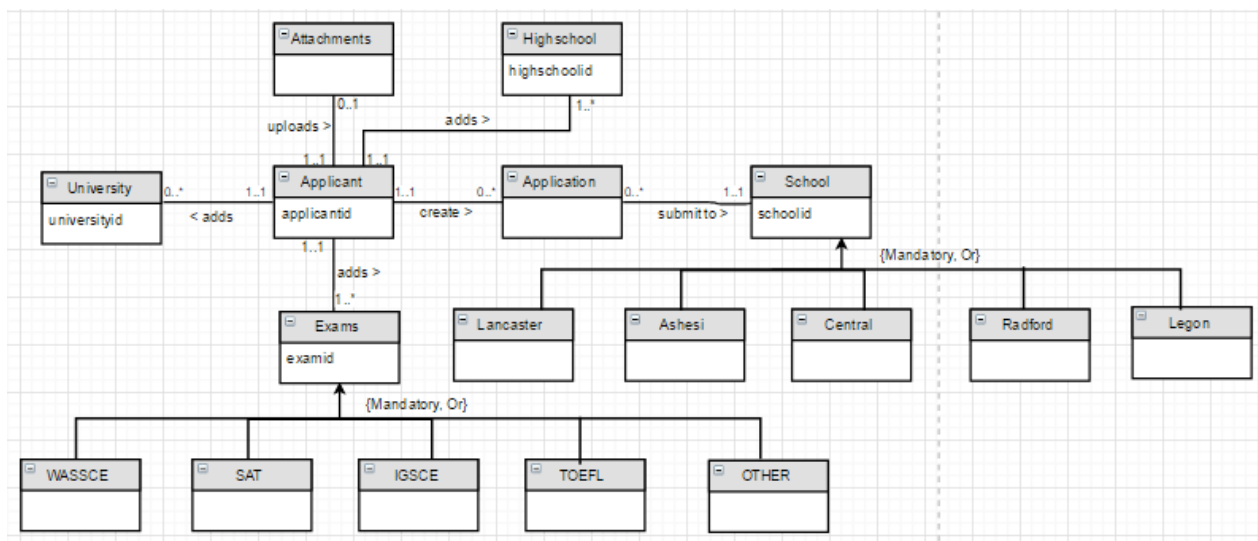


Figure 9: EER diagram

### 3.6 Database Architecture

The application makes use of a database as well as a filesystem for storing the uploads such as the images and the pdfs for passport pictures, transcripts and exam scores. As seen from the database architecture below, the *applicantid* which is the primary key of the *applicant* table is the foreign key in the *highschool*, *university* and *attachment* tables. The *applicantid* is also used to identify the applicant in the *igsce*, *sat*, *toefl*, *wassce* and *other* tables. The *other* table is created for exams which are not listed but are accepted by the selected schools. These tables represent the exams scores the applicant which to add. This *applicantid* links all the information about the applicant (the general information).

The school table keeps general information about the schools such as the name of the school, whether the school is open for admissions as well as the username and password to authenticate the staff when logging onto the school portal. Schools, however, have specific tables for the extra information required of the applicants. The *central*, *ashesi*, *lancaster*, *radford* and *legon* tables represent the schools Central University, Ashesi University, Lancaster University, Radford University and the University of Ghana respectively.

An application is created when the applicant selects a school. Therefore, the *application* table which has the *applicantid* and the *schoolid* as both primary keys for the table, thereby, creating a composite key. This is because each table will be different. Other attributes include the status of the application, comment, review made by a school admissions staff and the name of the reviewer.

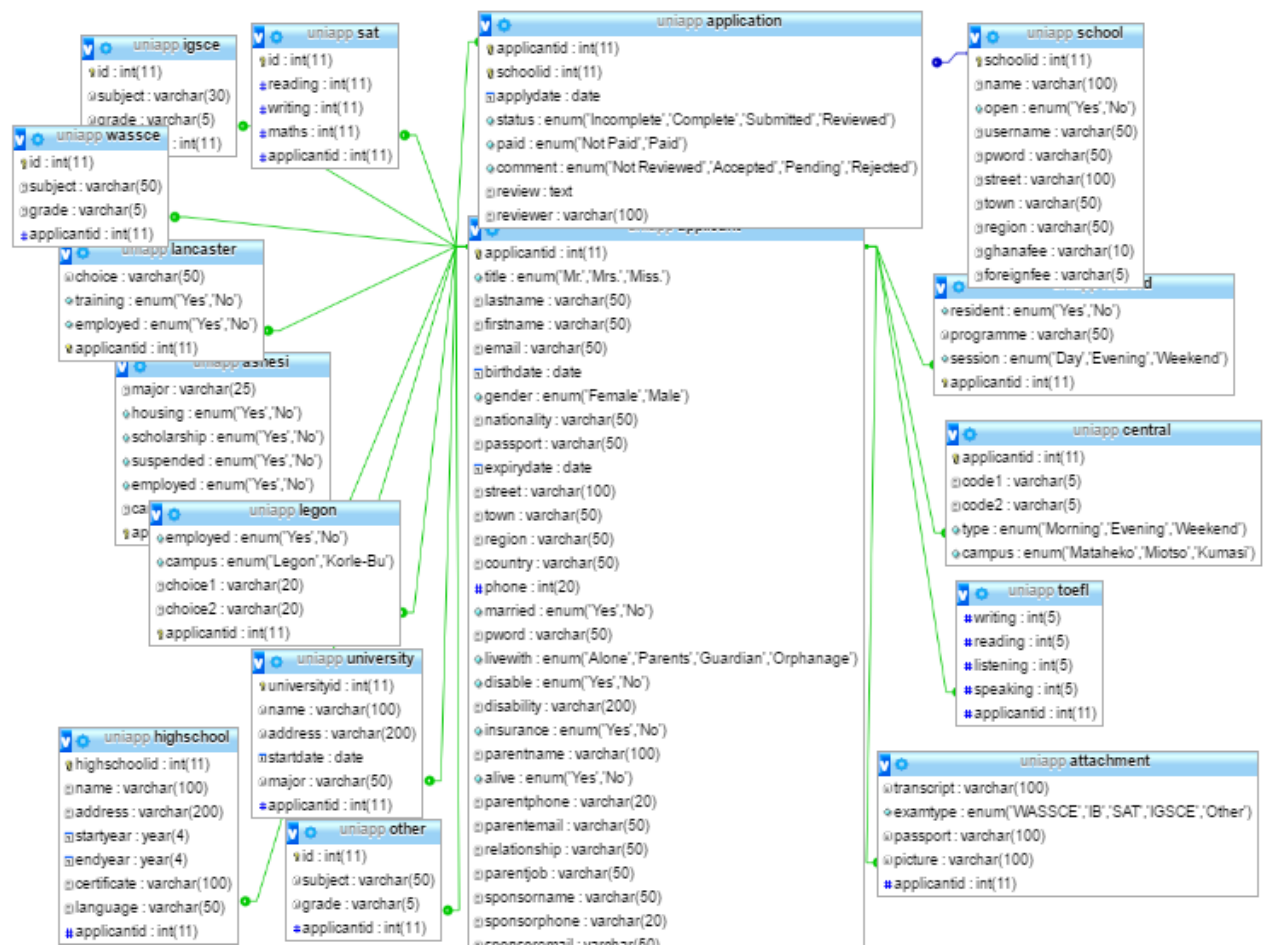


Figure 10: Database Architecture

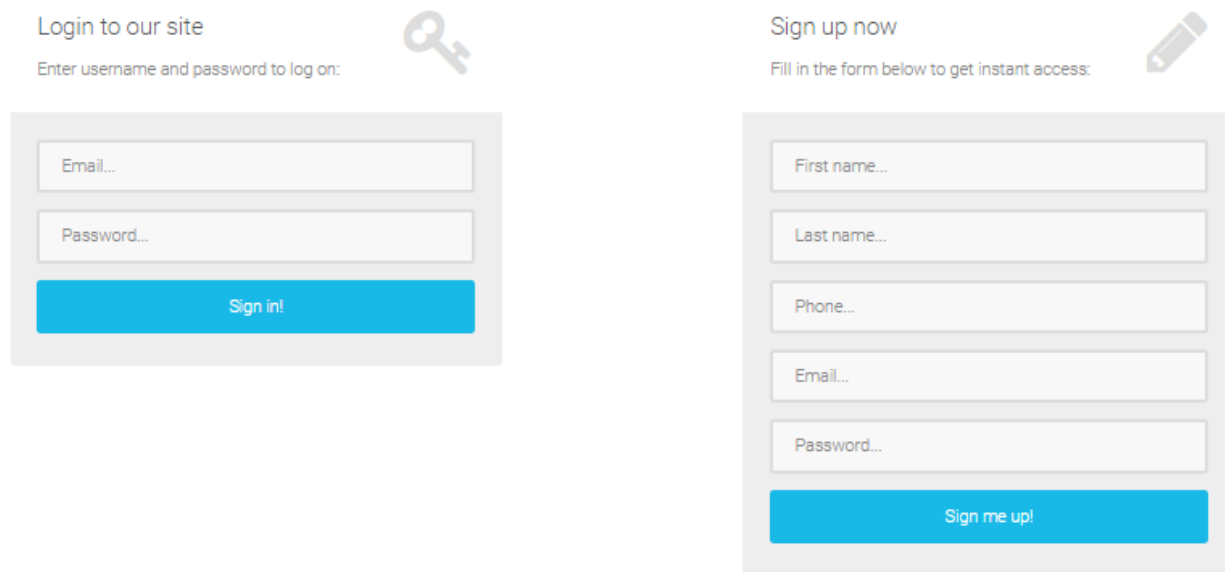
## CHAPTER 4: Implementation

This chapter gives more specific information about the functionalities which were implemented in the web application. The implementation process will also be described in detail.

### 4.1 User Interface Design

The interface included Dashboards, forms, lists, modals and uploads. Both the web application for the applicants and the school portal have the same theme for their user interface. This was to ensure consistency and simplicity. The aesthetics of the interface promotes calmness appeals to the user emotionally. The user interface is designed in such a way that it is attractive and easy to navigate with the provision of a side bar. The interface is clean, simple and attractive.

#### APPLICANT PORTAL



The image displays two side-by-side user interface forms for an applicant portal. The left form is titled 'Login to our site' with a key icon and the instruction 'Enter username and password to log on:'. It contains two input fields labeled 'Email...' and 'Password...', followed by a blue 'Sign in!' button. The right form is titled 'Sign up now' with a pencil icon and the instruction 'Fill in the form below to get instant access:'. It contains five input fields labeled 'First name...', 'Last name...', 'Phone...', 'Email...', and 'Password...', followed by a blue 'Sign me up!' button. Both forms are enclosed in light gray boxes.

Figure 11: Login/Register Page for Applicants

UNIAPP

PERSONAL

ACADEMIC HISTORY

ATTACHMENTS

EXAMINATIONS

SCHOOLS

PAYMENT

Personal

Log out

Edit Profile

APPLICANT ID

5

TITLE

Miss. ▾

EMAIL ADDRESS

tohbelle@gmail.com

FIRST NAME

Sylvia

LAST NAME

Umehh

GENDER

Male ▾

NATIONALITY

Nigeria

PASSPORT NUMBER

adhfof

EXPIRY DATE

02/24/2017

ADDRESS

21 Road, G1 Close, House 2B

CITY/TOWN

REGION

COUNTRY

Figure 12: Editing the personal information

UNIAPP

PERSONAL

ACADEMIC HISTORY

ATTACHMENTS

EXAMINATIONS

SCHOOLS

PAYMENT

Academic History

Log out

University

If you are currently studying, fill in the details of your university.

NAME	ADDRESS	START DATE	MAJOR	
University of Ghana	Legon, Ghana	2017-01-09	Computer Science	Edit

Add

HighSchools

Fill in the details about your recent HighSchools

NAME	ADDRESS	START YEAR	END YEAR	CERTIFICATE	LANGUAGE	
Loyola Jesuit College	Abuja, Nigeria	2007	2013	SSCE	English	Edit

Add

Figure 13: Editing academic records

28

UNIAPP

PERSONAL

ACADEMIC HISTORY

ATTACHMENTS

EXAMINATIONS

SCHOOLS

PAYMENT

Attachments

Log out

Upload a copy of each of the following documents

TRANSCRIPT

Choose File No file chosen

Upload file

PASSPORT BIO PAGE

Choose File No file chosen

Upload file

PASSPORT SIZED PICTURE

Choose File d3.png

Upload file

EXAMS SCORES

Choose File No file chosen

Upload file

Figure 14: Uploading attachments

UNIAPP

PERSONAL

ACADEMIC HISTORY

ATTACHMENTS

EXAMINATIONS

SCHOOLS

PAYMENT

Examinations

Log out

WASSCE

Fill in the details of your WASSCE grades.

SUBJECT	GRADE	
Physics	B2	Edit
Economics	A1	Edit
English	A1	Edit
Maths	A1	Edit

Add

SAT

Fill in the details of your SAT grades

CRITICAL READING	WRITING	MATHS

IGSCE

Fill in the details of your IGSCE grades.

SUBJECT	GRADE

Add

TOEFL

Fill in the details of your TOEFL grades.

WRITING	READING	LISTENING	SPEAKING

Figure 15: Inputting exam scores

UNIAPP

PERSONAL

ACADEMIC HISTORY

ATTACHMENTS

EXAMINATIONS

SCHOOLS

PAYMENT

Schools

Log out

List of Schools

Click on the "Add School" button to add the school to your application list

NAME	OPEN?	ADDRESS	
Radford University	Yes	83A Lagos Avenue, East Legon, Accra, Greater Accra	Add School
Lancaster University	Yes	opposite A&C Square, Jungle Road, East Legon, Accra, Greater Accra	Add School

My Schools

Click on the "Complete Application" button to complete your application

NAME	STATUS		
Central University	Submitted	Complete Application	Delete Application
Ashesi University	Incomplete	Complete Application	Delete Application

Figure 16: Selecting a school to apply to

UNIAPP

PERSONAL

ACADEMIC HISTORY

ATTACHMENTS

EXAMINATIONS

SCHOOLS

PAYMENT

Payment

Log out

Applications

Click on the Pay button to view the payment options for the school

NAME	STATUS	GHANAIAAN	INTERNATIONAL		
Central University	Submitted	GHC 100	\$100	Pay	Submit
Ashesi University	Incomplete	GHC 100	\$50	Pay	Submit

Figure 17: Paying and Submitting an application



## SCHOOL PORTAL

Login to your admin page

Enter school and password to log on:




Figure 18: Log in page for schools

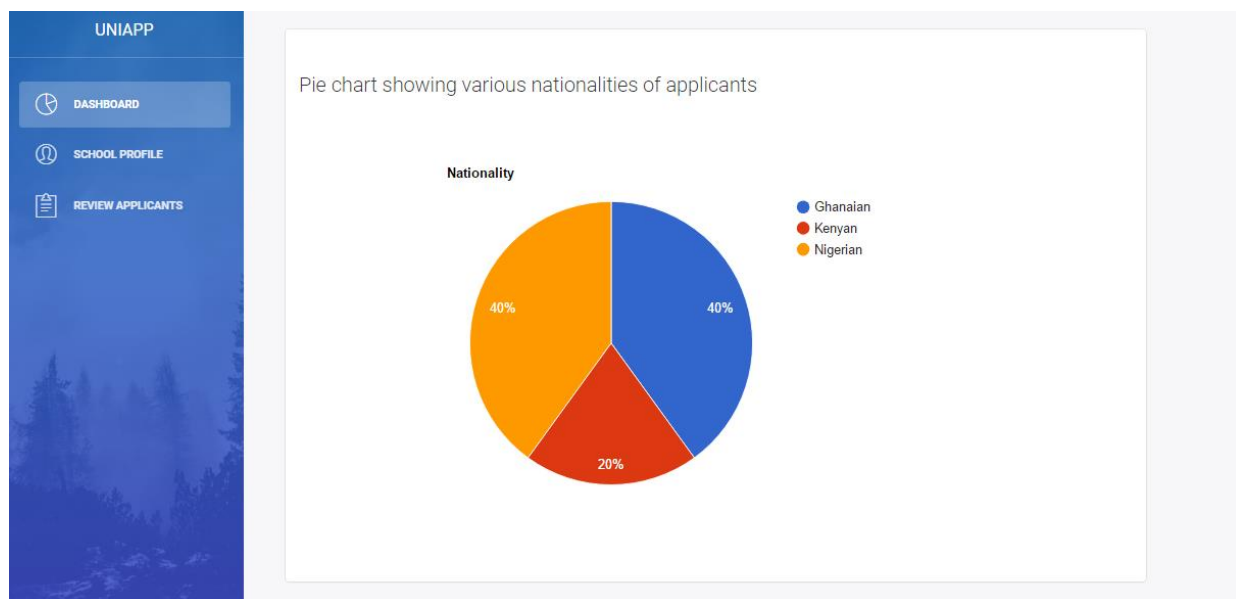
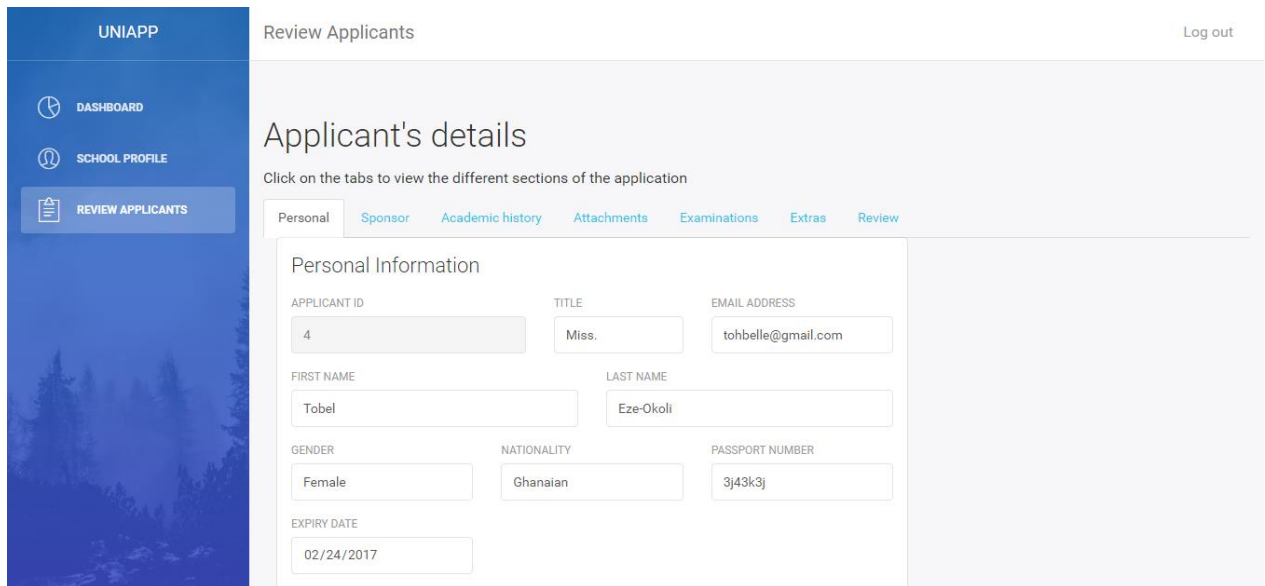


Figure 19: Dashboard showing statistics of applicants





UNIAPP

Review Applicants

Log out

DASHBOARD

SCHOOL PROFILE

REVIEW APPLICANTS

## Applicant's details

Click on the tabs to view the different sections of the application

Personal Sponsor Academic history Attachments Examinations Extras Review

### Personal Information

APPLICANT ID: 4

TITLE: Miss.

EMAIL ADDRESS: tohbelle@gmail.com

FIRST NAME: Tobel

LAST NAME: Eze-Okoli

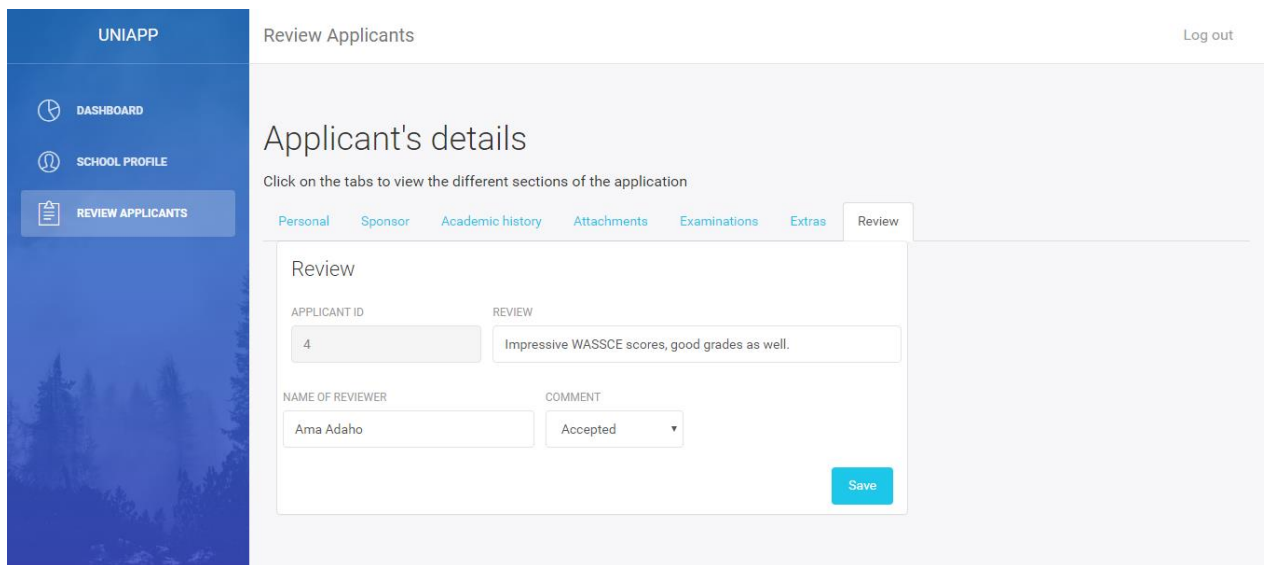
GENDER: Female

NATIONALITY: Ghanaian

PASSPORT NUMBER: 3j43k3j

EXPIRY DATE: 02/24/2017

Figure 22: Viewing details of an application



UNIAPP

Review Applicants

Log out

DASHBOARD

SCHOOL PROFILE

REVIEW APPLICANTS

## Applicant's details

Click on the tabs to view the different sections of the application

Personal Sponsor Academic history Attachments Examinations Extras Review

### Review

APPLICANT ID: 4

REVIEW: Impressive WASSCE scores, good grades as well.

NAME OF REVIEWER: Ama Adaho

COMMENT: Accepted

Save

Figure 23: Reviewing an application

## ADMIN PAGE

UNIAPP

PAYMENT STATUS

REGISTER SCHOOL

Applications

Log out

Applications

Change the payment status

APPLICANT ID	NAME	PHONE NUMBER	SCHOOL	PAYMENT STATUS	REFERENCE CODE	
53	Janis Mimiemba	261500785	Central University	Paid	DXT889944	<button>Paid</button>
11	Nana Yaw Akonnor	2147483647	Central University	Paid	DXT895990	<button>Paid</button>
5	Sylvia Umehh	2147483647	Central University	Paid	DXT896990	<button>Paid</button>
4	Tobel Eze-Okoli	2147483647	Central University	Paid	DXT364789	<button>Paid</button>
2	Barry Amon	2147483647	Central University	Not Paid		<button>Paid</button>
53	Janis Mimiemba	261500785	Radford University	Not Paid		<button>Paid</button>
4	Tobel Eze-Okoli	2147483647	Radford University	Not Paid		<button>Paid</button>
53	Janis Mimiemba	261500785	Lancaster University	Not Paid		<button>Paid</button>

Figure 24: Updating the payment status

UNIAPP

PAYMENT STATUS

REGISTER SCHOOL

Applications

Log out

Register a School

NAME OF SCHOOL

OPEN?

USERNAME

PASSWORD

Select

STREET

TOWN

REGION

FEES FOR GHANAIS

FEES FOR FOREIGNERS

PAYMENT URL

WEBSITE URL

Save

Figure 25: Registering a school

## 4.2 Sequence diagrams

### 4.2.1 Submitting an application

Before submitting an application, the applicant is required to fill the general form first and then select the school, he/she wishes to apply to. The applicant will be required to select a school from the presented list of schools on the application (see Figure 16). After selecting a school, if there are extra requirements specific to that school, the applicant will have to complete the application before submitting it.

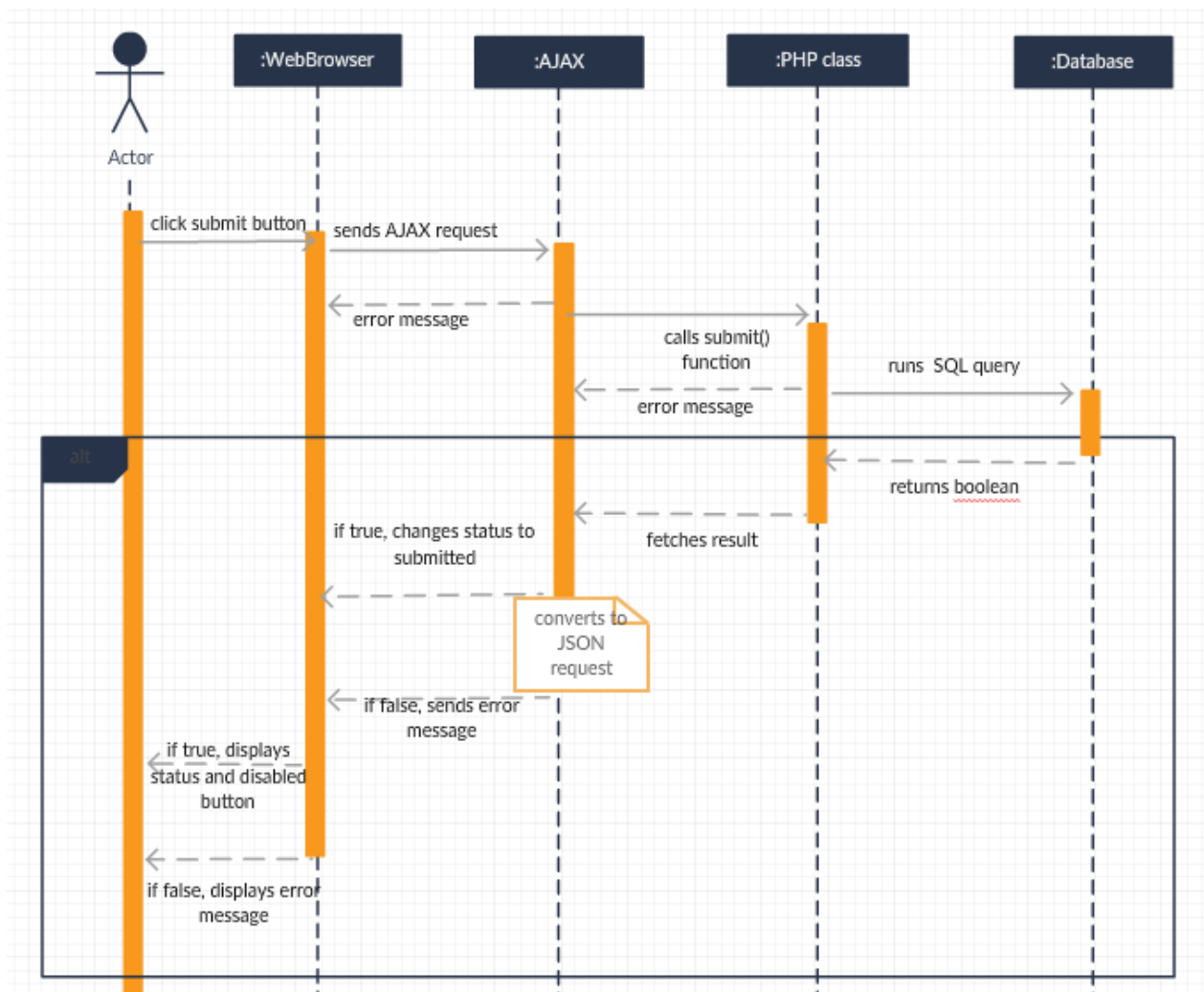


Figure 26: Sequence diagram for submitting an application

To submit the application, the applicant clicks the submit button and the request is sent to the *applicationajax* page which calls the *submit()* function in the *application* class. The query is run and the database returns a response to the *application* class. If the response is true, the status of the application will be changed to “Submitted” but if it is false, then the applicant will receive an error message saying that the “Could not submit application”.

```
function submit() {  
    if (($REQUEST['schoolid']=="")) {  
        echo '{"result":0, "message": "Schoolid was not given"}';  
        return;  
    }  
  
    include_once("application.php");  
    $obj = new application();  
    $schoolid= $_REQUEST['schoolid'];  
  
    $applicantid = $_SESSION['applicantid'];  
  
    $a = $obj->submit($applicantid,$schoolid);  
  
    if (!$a) {  
        echo '{"result":0 , "message": "Could not submit application"}';  
    }  
  
    else {  
        echo '{"result": 1, "message": "Application submitted"}';  
    }  
}
```

Figure 27: submit function in applicationajax page

```
function submit($applicantid='none',$schoolid='none'){  
    $strQuery="update application SET status = 'Submitted' where applicantid='$applicantid' && schoolid='$schoolid'";  
    return $this->query($strQuery);  
}
```

Figure 28: Query to submit application in application class

#### 4.2.2 Receiving an application

Once an applicant starts an application for a specific school, the school is aware of it. As shown in Figure 21, the school can view the list of applicants who have started an application for their school. The status of the application informs the schools that the application is either incomplete, complete or submitted.

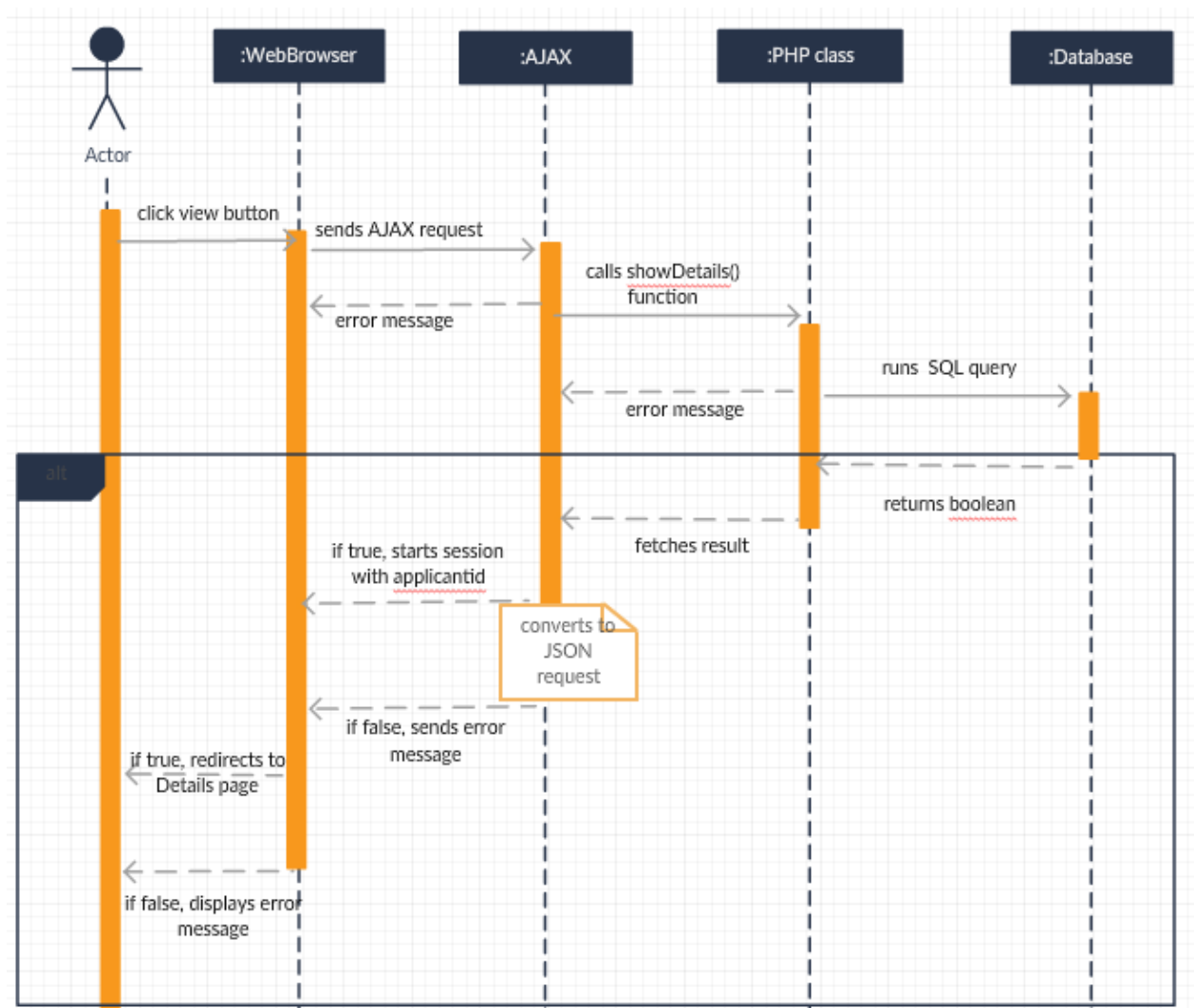


Figure 29: Sequence diagram for viewing an applicant's details

To view an application, the school admissions staff selects the view button (see Figure 21). A request is sent to the *applicantsajax* page which calls the *showDetails()* function in the *applicants* class. The function runs the query and then returns a result. If the result is true, a session is started and the user redirected to the Details page (see Figure 22). If the result is false, then an error message is sent to the user. With the session created, it is possible to retrieve information about the applicant with the applicant's ID.

```
function showDetails(){
    if (($_REQUEST['id']=="")) {
        echo '{"result":0, "message": "applicantid was not given"}';
        return;
    }
    $_SESSION['applicantid']=$_REQUEST['id'];
    echo '{"result":1, "message": "Loading applicant details..."}';
}
```

Figure 30: Function that starts a session for the applicant

Other functionalities which were also implemented include:

#### 4.2.3 Uploading a document

Documents such as transcripts, passport bio pages, passport pictures and exam scores are required by schools during the application process. The application makes provision for this by providing an “Attachments” section in the application where the applicant upload copies of documents. The upload functionality uses the filesystem approach. This means that when the document is uploaded, the document is moved to a folder in the htdocs folder of the application. The document is saved in the applicant's ID, thereby making it easy to retrieve to display to the school during review. There are different folders for the different documents which are to be uploaded.



```

<?php
session_start();
$applicantid=$_SESSION['applicantid'];

$target_dir = "uploads/transcripts/";
$original_file = $target_dir . basename($_FILES["fileToUpload"]["name"]);
$target_file = $target_dir . basename($_FILES["fileToUpload"]["name"]);
$imageFileType = pathinfo($target_file,PATHINFO_EXTENSION);
echo "<div>Extension is : $imageFileType</div>";

//save the file in the applicant's ID
$target_file = $target_dir . $applicantid.".".$imageFileType;

// Allow certain file formats
if($imageFileType != "pdf") {
    echo "Sorry, only PDF files are allowed.";
    $uploadOk = 0;
}else{
    $uploadOk = 1;
}

// Check if $uploadOk is set to 0 by an error
if ($uploadOk == 0) {
    echo "Sorry, your file was not uploaded.";
    // if everything is ok, try to upload file
} else {
    if (move_uploaded_file($_FILES["fileToUpload"]["tmp_name"], $target_file)) {
        echo "The file ". basename( $_FILES["fileToUpload"]["name"]). " has been uploaded.";
    } else {
        echo "Sorry, there was an error uploading your file.";
    }
}
?>

```

Figure 31: Code to upload a transcript

#### 4.2.4 Editing personal information

To save the applicant's progress, any changes made to the profile must be saved. To implement this functionality, the applicant table in the database is updated every time a change is made and the "Save" button is clicked. The applicant's ID is stored in a session and this variable is passed from the AJAX page to the *updatePersonal()* function in the applicants page as the *applicantid*. All other necessary information were also passed as parameters to this function.

```
function updatePersonal($applicantid='none',$title='none',$email='none',$firstname='none',$lastname='none',$gender='none',
$nationality='none',$passport='none',$expirydate='none',$street='none',$town='none',$region='none',$country='none',
$birthdate='none',$phone='none',$livewith='none',$married='none',$disable='none',$disability='none',$insurance='none',
$parentname='none',$alive='none',$parentphone='none',$parentemail='none',$relationship='none',$parentjob='none',
$sponsorname='none',$sponsorphone='none',$sponsoremail='none'){
    $strQuery="update applicant SET title='$title',email='$email',firstname='$firstname',lastname='$lastname',gender='$gender',
nationality='$nationality',passport='$passport',expirydate='$expirydate',street='$street',town='$town',region='$region',
country='$country',birthdate='$birthdate',phone='$phone',livewith='$livewith',married='$married',disable='$disable',
disability='$disability',insurance='$insurance',parentname='$parentname',alive='$alive',parentphone='$parentphone',
parentemail='$parentemail',relationship='$relationship',parentjob='$parentjob', sponsorname='$sponsorname',
sponsorphone='$sponsorphone',sponsoremail='$sponsoremail' where applicantid='$applicantid';
    return $this->query($strQuery);
}
```

Figure 32: Code to update personal information

#### 4.2.5 Downloading an attachment

To enable the school to download an attachment which an applicant has uploaded, the download page is called and the applicant's ID which is stored in the session is passed as a parameter to the function as a variable called id.

```
<?php
session_start();
$id=$_SESSION['applicantid'];
header('Content-Type: application/pdf');

// It will be called transcript.pdf
header('Content-Disposition: filename="transcript.pdf"');
// The PDF source is in original.pdf
readfile('./uploads/transcripts/'.$id.'.pdf');
?>
```

Figure 33: code to download attachments

#### 4.2.6 Exporting information

During user testing, a school admissions staff recommended that a new feature be implemented where the information gathered about the applicants be exported to a document which can be integrated with the school's database. Therefore, the functionality whereby the list of applicants is exported to a csv was implemented.

#### 4.2.7 Payment System

MPOWER payments solutions platform was integrated to the application to enable applicants pay the application fees. An MPOWER developer account was created and stores created for each university. This store would hold all payments made to a particular university. The URLs were saved in the school table in the database for every school. The applicant would be directed to that URL when he/she clicks on the “Pay” button (see Figure 17).

**MPOWER Payments** TOBEL SYLVIA EZE-OKOLI

**Click2Pay Details**

<b>Store Name</b>	CENTRAL UNIVERSITY
<b>Payment Description</b>	Payment of application fees for Central University
<b>Amount</b>	₦ 1.0

**Click2Pay Instructions**

`https://app.mpowerpayments.com/click2pay-redirect/03b268d0408` Direct Link, you may use this in Emails, SMS, IMs etc.

`<a href="https://app.mpowerpayments.com/click2pay-redirect/03b268d0408fc00df7d43671">Pay with MPOWER</a>` Copy & Paste the contents of the textarea into your website

**Update** **Delete**

Figure 34: MPOWER store creation page

Figure 35: MPower user payments page

#### 4.2.8 Sending notifications

Applicants receive both Email and SMS notifications after creating an account on the application. To send an email notification after sign up, the pnp.ini config file of the xampp application was modified to allow the mails to be sent using the HmailServer administrator account created for the application. The email address and first name of the applicant are passed as parameters to the function in the PHP class.

```
function sendEmail($email='none', $firstname='none'){
    mail($email,"Thank you for registering with UniApp","Dear $firstname, Thank you for registering with UniApp.
    Log in with this link localhost/uniapp/index.html. We look forward to assisting you with your applications.
    Best,
    The UniApp Team.");
}
```

Figure 36: code for sending emails after sign up

SMS notifications are also sent when an application is paid for and submitted. The phone number of the applicant is passed to the function in PHP class.

```

function signupsms($phone){
    require './SmsgH/Api.php';

    $auth = new BasicAuth("mbdoleqn", "ffbdrjpg");
    // instance of ApiHost
    $apiHost = new ApiHost($auth);

    // instance of AccountApi
    $accountApi = new AccountApi($apiHost);
    // Get the account profile
    // Let us try to send some message
    $messagingApi = new MessagingApi($apiHost);
    try {
        // Send a quick message
        // var_dump($phone);
        $mesg = new Message();
        $mesg->setContent("Thank you for registering with UniApp. Goodluck!");
        $mesg->setTo("+".$phone);
        $mesg->setFrom("UniApp");
        $mesg->setRegisteredDelivery(true);

        // Let us say we want to send the message 3 days from today

        $messageResponse = null; #
        $messageResponse = $messagingApi->sendMessage($mesg);
        if($messageResponse)
        {
            if ($messageResponse instanceof MessageResponse) {
                echo $messageResponse->getStatus();
            } elseif ($messageResponse instanceof HttpResponse) {
                echo "\nServer Response Status : " . $messageResponse->getStatus();
            }
        }
    } catch (Exception $ex) {
        echo $ex->getTraceAsString();
    }
}

```

Figure 37: code for sending SMS after sign up

#### 4.2.9 Displaying a chart

Applicants were grouped depending on their nationalities and displayed in a pie chart for the school to view in a glimpse.

```

google.charts.setOnLoadCallback(drawAnotherChart);

function drawAnotherChart() {

    var data = google.visualization.arrayToDataTable([
        // ['Task', 'Hours per Day'],
        // ['Work',     11],
        // ['Eat',      2],
        // ['Commute',  2],
        // ['Watch TV', 2],
        // ['Sleep',    7]

        <?php
            session_start();

            $obj=new schools;
            $schoolid = $_SESSION['schoolid'];
            $result = $obj->getNationality($schoolid);

            $array = array();

            while($row = $obj->fetch()){
                $array[] = $row;
            }
        ?>
        ['Nationality', 'Applicants'],
        <?php
            foreach($array as $row){
                print ("['".$row['nationality']."'."',".$row['count']."],");
            }
        ?>
    ]]);

    var options = {
        title: 'Nationality'
    };

    var chart = new google.visualization.PieChart(document.getElementById('anotherpiechart'));

    chart.draw(data, options);
}

```

Figure 38: Code to display the nationalities of applicants in a pie chart

Other functionalities which were also implemented include; reviewing an application, adding the details of previous academic institutions, editing the school profile, updating the payment status of an application and registering a school.

### 4.3 Class diagram

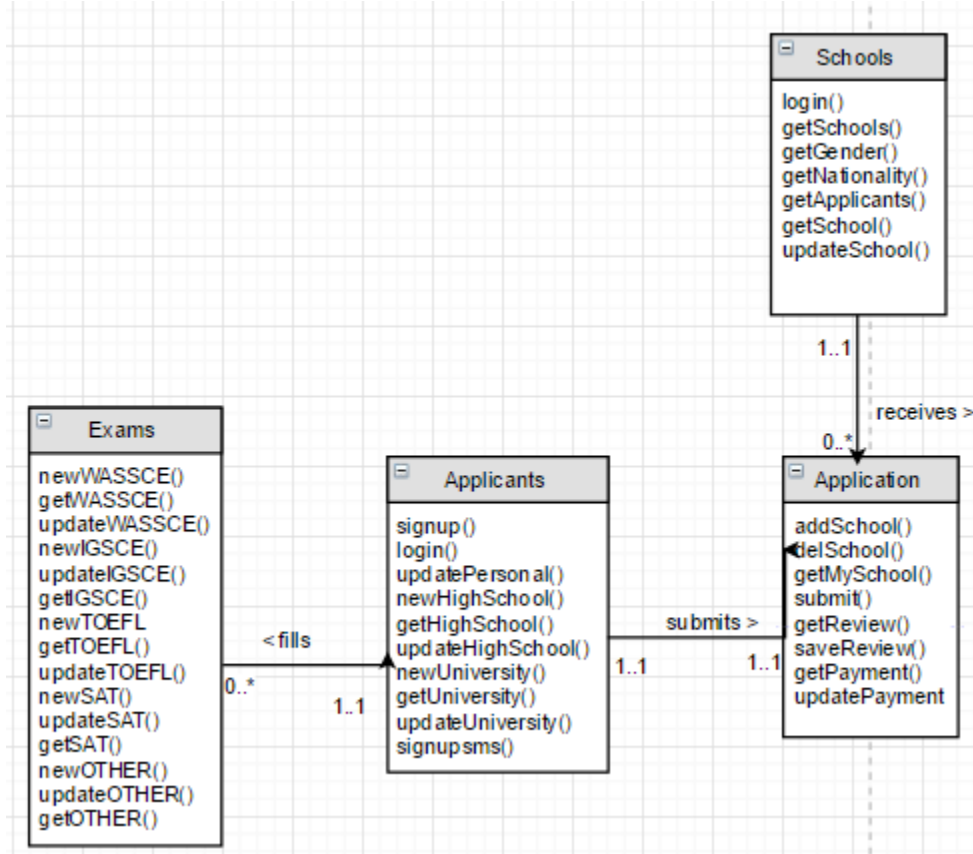


Figure 39: Class Diagram

### 4.6 Technology, tools and platform

- Bootstrap template: A Bootstrap HTML template was used for the implementation of the front end of the application.
- HmailServer: This application was integrated to the application to send emails to applicants when they create an account on the application. This purpose of this process is to authenticate the email address with which applicants use to register.
- Technologies: PHP language was used for the backend implementation as well as SQL for updating the database.

- AJAX functions: Client-side and Server-side JavaScript functions were used to enable interactive pages and faster processing of queries.
- Payment platforms – MPower Payments solutions was integrated into the application to provide online payment options. An account was created, a URL link generated and a test payment page setup.
- Google Charts: Google Charts were used to display the statistics of the applicants to the schools.
- Platforms: Sublime, XAMPP and workbench were the platforms used in this implementation.
- SMS notifications – SMSgh API was used to send SMS notifications to users.



## **CHAPTER 5: Testing**

### **5.1 Overview**

Validation and verification have been used to ensure that the software fits the users' requirements both functional and non-functional. For this application, development and user tests were conducted to test its usability and functionality.

The main objective for testing this application is to ensure that it is easy to use. The usability of this application will be dependent on the following factors:

- How quickly can the user perform tasks?
- Is the user able to learn the user interface?
- How frequent are the errors made by the user?
- Does a returning user remember how to use the application?
- Is the user satisfied with the product?

### **5.2 Development testing**

These are tests carried out by the application developer such as unit tests, component tests and system tests. These tests include debugging carried out by the developer.

#### **5.2.1 Unit testing**

For the unit testing procedure, object classes and functions are tested to ensure that the objects are working correctly. The main object classes in this application are the Applicant, Application, Exams and School classes. All methods were tested by running the SQL queries directly in the database. The AJAX pages were also tested by running the queries in the browser and checking to see if they return the correct response to the user.

### 5.2.2 Component testing

For the applicant's portal, components which are made up of units include the personal, academic history, examinations, attachments and school sections for the applicants. For the school portal, the main components were the dashboard, school profile and the review section.

These components were tested individually by checking that when there was a new addition, all the information was correctly inserted in to their respective fields in the database. Furthermore, when a section was edited, that the table was correctly updated in the database with the correct information. Displaying the correct data properly in the user interface was also taken into consideration.

### 5.2.3 System testing

A systems test was carried out on both applicant and school portals. The objective of this test is to ensure that all components work together seamlessly and that information is circulated throughout the application correctly. To ensure product usability, all sections can be accessed from each page through the use of the sidebar. However, there seemed to be a lag in the loading of data at times, especially when new data has just been added to the database.

Minimum requirements: Any device with browser functionalities and internet access.

## **5.3 User testing**

User testing was carried out to ensure that the application truly meets the needs of the users. As defined earlier in chapter 2, there are two main categories of users, the applicants and the school admissions staff. The users tested the application on their respective portals.

### 5.3.1 Testing the Applicant Portal

To ensure that the application was adequately tested, the users who partook in the testing procedure consisted of international and Ghanaian students. This is due to the fact that international students also apply to Ghanaian universities and it would be helpful to receive feedback based on their experiences.

A total of 12 students were enlisted to take part in the user testing of this application. This set of users comprised of 6 international and 6 Ghanaian students. The students were given a brief description of the application after which they were given the application to test. Although they were left with the application, their interaction process was monitored as well as timed. However, the students were encouraged to ask questions and provide comments where necessary. After their interaction has ended, the users were asked questions to get their feedback on what they were impressed with or recommendations for improvements.

#### Results:

Some users suggested the idea of a link whereby they can learn more information about the schools. Furthermore, some users brought up the concern that they would want to know when the general form was complete. The international students were impressed with the fact that there was an other table for entering exams score as that catered specifically to their needs.

It was also noted that the users took quite a longer time than desired to navigate the application. Therefore, guides such as tooltips, alerts and pop-ups will be implemented to aid with this.

### 5.3.2 Testing the School Portal

The school admissions staff who were interviewed earlier on for the requirements gathering participated in the testing of the application. The application was set up for the staff and the username and password given to them depending on which school they were signing in for. The testing process was timed and observed. After interacting with the application, the staff members were asked for their feedback and recommendations.

#### Results:

The school admissions staff was mainly impressed with the charts as they gave a quick overview of the applicants they received. They liked the fact that they could view the application of the applicants regardless of the fact that it was not submitted or paid for. This would help the staff assist the applicant where need be. They also were satisfied with the review section.

When asked about the application, they commented that they found the application easy to use and the interface attractive and simple. The page flow allowed for easy navigation of the application. However, they gave suggestions about new features which could be implemented in the future. Some of the new features include adding a button which exported the information to a document which the school can use and displaying the information in charts. These features were implemented in the application (See Figure 38).

## **CHAPTER 6: Conclusions**

### **6.1 Overview**

In this chapter, general conclusions, challenges and future work will be covered here.

### **6.2 Challenges**

There were two main challenges which were encountered during the implementation of this application. The challenges were streamlining the application requirements and selecting a suitable payments system for the web application.

Merging the information from all the 5 schools used in the sample was a challenge. This mainly because it became difficult to decide which information was required in the general form and which information was to remain in the extra section for their specific schools. However, using a quota, I was able to merge the information well. The quota was that information which was required by 60% of the schools in my sample was added to the general form.

Finding a suitable payment solution was quite a challenge as schools used various online payment options which some did not accept as a mode of payment for application fees. However, MPower Payments solutions was selected because it provided a wide range of online payment options.

### **6.3 Future work**

Although a sample of 5 schools was used for the collation of application forms, if the project was to be continued, future work would include the inclusion of other schools; polytechnics, college of education and public universities. This would evidently change parts of

the general form provided in the application. While the application was successful with the sample of 5 schools, more work will be put into a larger sample of schools.

A forum whereby applicants can ask questions and get them answered directly by the schools themselves could be implemented in the future. This would potentially reduce the number of emails and phone calls school receive during admissions period.

To ensure that the applicant is required to provide the least amount of information on the web application, an algorithm can be implemented which customizes the application for the applicant when the schools have been selected.

## **6.4 Conclusion**

The design and implementation of a web application whereby applicants are able to fill their information once and apply to multiple schools was successful although there is still much work to be done in particular areas.

Some of the strengths of this application is that all changes made by the applicant are saved when the applicant is logged in. This allows the applicant to fill and complete the applications at his/her convenience. Furthermore, the time spent during the application process is significantly reduced as the applicant fills their personal information only once and can apply to as many schools as possible with the same information. Another strength of this application is that the applicant is able to keep track of his/her applications as he/she receives SMS notifications when the applicant signs up, pays or submits an application. This increases transparency in the application process as the applicant is aware of the movement of the application. Finally, schools

can view applications which have been created and not necessarily completed, paid for or submitted. This allows the school to also track the progress of the applications they receive.

Despite the significant accomplishments of this project, there are a few gaps in the implementation of this application. On the Dashboard page of the school's portal, only one chart is shown in the application. It would have been more advantageous to the schools if more graphs displaying more information about the applicants could be shown. Another flaw in this application is the lack of implementation of the school pages, excluding Central University, which require extra information. Unfortunately, due to the lack of time, that functionality was not implemented in the application.

With the research carried out, requirements gathered, design and implementation of the functionalities in this application, it is clear to see that a suitable universal online application system for the universities in Ghana can be built to fit the Ghanaian context.

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